



Different photoperiodic effect on moth parameter of Eri silkworm (*Philosamia ricini*) L. (Saturniidae: Lepidoptera)

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Abstract

Current study represents the different photoperiodic effect on the moth parameter of Eri Silkworm (*Philosamia ricini*). During the course of study it was observed that maximum emergence of the moth was obtained in 08 hr light and 16hr darkness which is appropriate photo period in comparison to control (normal light and dark). In the present experiment it was observed that the male moths emerged earlier than the female moth.

Key words: *Ericulture, Photoperiod, Moth Emergence, Castor, Philosamia ricini*

Introduction

Eri silkworm (*Philosamia ricini*) is a polyphagous and multivoltine race of wild silkworm, and feeds on a wide range of host plants. (Sirimungkararat, 2014) Like domesticated variety of *Bombyx mori*, *P. ricini* also plays an important role in many industries. It has also been studied and utilized in various fields such as cosmetic products, processed food supplements, clothing and medical sutures, etc. (Akai,2002; Sirimungkararat *et al.*, 2010, 2012) The value of any ecofriendly activity of sericulture depends upon two main factors i.e. abiotic and biotic. In all these factors light and dark both are considered as vital factor. They play a key role on full growth and productivity of silk and byproducts of domesticated, *B.mori* (Kumari *et al.*, 2011). It is well known fact that light and dark are very important factor for growth of any organism including insects. According to Mishra, (2011) Light is the one of the most powerful vital factors for growth of any organism. As it affects the daily rhythm of day and night followed by seasonal changes. Many researchers have worked on photoperiodic effect on behavioral pattern in different variety of domesticated silk moth (Tanaka,1966). Insects in their evolution of ecological, physiological, morphological and behavior have adopted themselves to different geophysical patterns of photoperiod. Daily patterns of behavior are apparent in the activities of most

insect species, viz locomotion, feeding, matting, oviposition, etc. The present study is accomplished to determine the effect of different photoperiod on moth parameter of Eri silkworm (*P. ricini*).

Materials and Methods

Disease free laying of eri silk worm were arranged from Government department of Sericulture Madhya Pradesh. The appropriate temperature and relative humidity were maintained at $20^{\circ}\pm 5^{\circ}$ C and $75\%\pm 5\%$ respectively. Rearing was done in suitable condition as per the recommendation given by Choudhary *et al.*, (1982). The *P. ricini* larvae were fed with castor leaves twice during their first Instars stage, thrice during second and third instars stage, and four times during their fourth and fifth instar stage, with daily bed cleaning. When the growing worms are ready for molts and have last instars stage, feeding was stopped at this condition. On this step, the ripe worms were handpicked and transferred to Chandrika (mountages) for cocoon spinning. After about fifteen days of spinning the adult moths emerge out from morning to mid-day, we used six rearing trays for this experiment with photoperiodic adjustment. After the complete larval duration, ripe worms (mature larvae) were transferred on mountages (Chandrika) for cocoon formation (including spinning and prepupal duration) emergence had noted under the all-experimental photoperiods. After completion of moth emergence, the percentage of the total moth

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emerged at different times of day was recorded. Soon after the emergence, adult moths were taken and placed into petri plate separately and kept under experimental photoperiods. The statistical method of student t-test and analysis of the variance were done for a level of significance.

Treatment details:

G1- Control (natural day and night), G2- complete light (LL), G3- 10h light and 14h darkness (10L: 14D), G3- 08h light and 16h darkness (08L: 16D), G4- 05h light and 19h darkness (05L: 19D), G5- complete darkness (DD). The result was expressed by the following formulae: The moth emergence: - The moth emergence calculated by following formula:

$$\text{The adult emergence (\%)} = \left\{ \frac{\text{Number of the adult emerge}}{\text{Number of cocoons kept for adult emergence}} \right\} \times 100$$

Results and Discussion

The emergence of the moth at the different times of the day, was found to be maximum between early mornings to noon under all the photoperiods. In all photoperiods more percentage of the moth emergence observed in G5, 05L:19D (98.6±0.094) (P>0.001) which is a notable higher than control G1, 12L:12D (90.0±0.399) followed by G4, 08L:16D (96.6±0.306) (P>0.001) and G3, 10L:14D (92.6±0.256) (P<0.001). The less percentage of moth emergence shown by G2, complete light (86.6±0.248) (P<0.001) which is a notable lower than control followed by G6, complete dark (86.6±0.306) (table 1 and Fig. 1). In the experimental duration male moths were emerged earlier than the female moth. It was also observed that in most of the treatment the peak time of the emergence of moth was early morning to noon, this indicates that at least a short photoperiod or darkness helps the insect to emerge out. These results are in agreement with the work of Rao (1986) who reported that emergence of moth of *P. ricini* reared at the different experimental photoperiods indicates that the emergence time is not affected by the different day length. It was the highest at early morning time to morning 2A.M. to 6A.M. Since most of the intermediate day lengths the pupal period was not notable affected, the emergence was also not affected, however, such a discernible peak could not be observed in the

complete darkness or the complete light. The pattern of emergence of moth correlated with the locomotor's activity rhythm and the reproduction behavior pattern of the species, most of the moths are nocturnal, the results are also very close to the work of Saikia *et al.*, 2014, study shows that light has effect on the whole development on *P. ricini*.

Table 1: Different photoperiodic effect on the moth emergence of Eri Silkworm (*Philosamia ricini*) in gram.

Groups	Photoperiod in hours	Moth Emergence ± SE (%)
G1	12L:12D	90.0±0.399
G2	LL	84.6±0.248
G3	10L:14D	92.6±0.256
G4	08L:16D	96.6±0.306
G5	05L:19D	98.6±0.094
G6	DD	86.6±0.306

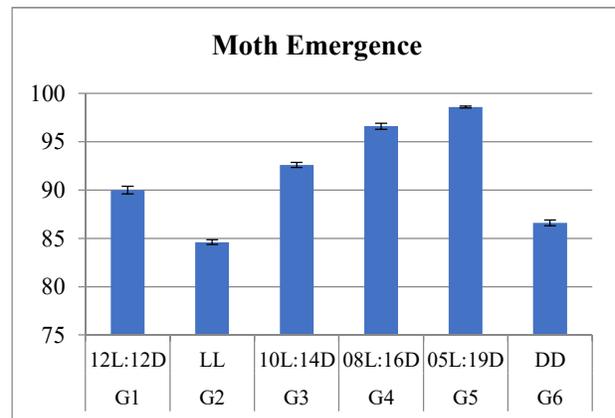


Figure 1: Different photoperiodic effect on the moth emergence of Eri Silkworm (*Philosamia ricini*) in gram. Value = Mean ± SE

Significance of difference from control (*P<0.001, ***P<0.001, ***P<0.001, ***P>0.001, ***P>0.001; Student's 't' test)

Conclusion

The present study revealed that the percentage of the moth emergence was maximum in G5 (05L:19D) this group is a suitable photo regime for the emergence of moths during the experiment. The male moths emerged earlier than the female moth. Under the complete dark and the complete light, the moth emergence was irregular and occurred at all time of the day.



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